DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application]This invention relates to a printer which has the function to download and use an object from the exterior, a system, and a method for controlling the same.

[0002]

[Description of the Prior Art]Conventionally, an object is downloaded from the exterior and the printer which can use this occurs. The portion (downloader) into which the information (downloaded information) about the downloaded object generally downloads manages. And the printer can carry out a new function by processing using the downloaded object.

[0003]

[Problem(s) to be Solved by the Invention]However, in the above-mentioned conventional printer, downloaded information is data which only downloader can refer to. downloader notifies such downloaded information to the program for performing other functions -- as -- it is not constituted. For this reason, downloaded information cannot be referred to from the program which performs other functions. For this reason, neither a host computer nor the user can recognize what kind of data downloaded to the printer, but has interfered with various processing or operation.

[0004]For example, when it is going to output the print data which should be processed using a download object with a host computer to a printer, the download object used first is outputted to a printer. Here, even when the download object has already downloaded to the printer concerned, a host computer does not have a means to recognize this and duplicate download (it is useless download) will be performed.

[0005]When using the functions (for example, emulator program etc.) provided by download or extended ROM in the above-mentioned conventional printer, the memory area for exclusive use required for the function needs to be secured beforehand. That is, to enable two or more downloads of a kind, it is necessary to secure on a memory only the field which is required for the number and each. For this reason, the field always assigned also to the intact download function will be vacated, and the utilization efficiency of a memory falls.

[0006]This invention is made in view of the above-mentioned problem, and is a thing.
The purpose is to provide a printer which enables the reference of the information on the object which downloaded the object in the available printer from function parts other than downloader, a system, and a method for controlling the same.

[0007]Other purposes of this invention are to provide a printer which can be notified to a user or the exterior, and a method for controlling the same about the contents of downloaded information.

[0008]When other purposes of this invention notify the downloaded information of the printer concerned to a host computer, It makes it possible to prevent the duplicate download to a printer from a host computer, and is in providing a printer which improves the processing speed of a system, a system, and a method for controlling the same.

[0009]When other purposes of this invention improve management of assignment of the memory which a download program uses, It is in providing a printer which can attain the flexible correspondence to facilitation of memory management, mitigation of memory consumption, change of the program provided by the download program or extended ROM, etc., a system, and a method for controlling the same.

[0010]

[Means for Solving the Problem]A printer of this invention for attaining the above-mentioned purpose is provided with the following.

A loading means which downloads an object from the exterior.
A storing means which stores information about an object downloaded by said loading means.
A reading means which reads information stored by said storing means.
An output means which outputs information read by said reading means.

[0011]According to the above-mentioned composition, information about an object downloaded by a loading means stored by a storing means is read by reading means, and is outputted to a various function part etc. which perform a predetermined function by an output means.

[0012]Said output means outputs preferably information read by said reading means to an external device connected to the printer concerned. It is because it becomes possible to recognize an object which an external device has downloaded and becomes possible to use this information for processing of various kinds of this external device. It becomes possible to share a telecommunication cable for print data by making connection with the above-mentioned external device by a means of communication in which two-way communication is possible.

[0013]Said output means performs a display output preferably based on information read by said reading means. It enables this to show a user information about a downloaded object with a printer simple substance.

[0014]Said output means performs a printout preferably based on information read by said reading means. It enables this to show a user information about a downloaded object with a printer simple substance.

[0015]Said objects are the patch programs for changing an internally stored program of the printer concerned selectively preferably. It is because this becomes possible to correct a fault part in an internally stored program selectively, for example.

[0016]Said object is the image data created in said exterior preferably. This becomes possible to store overlay data as an object, for example, and processing speed can be raised when overlay data are used over two or more pages.

[0017]An information processing system of this invention which attains the above-mentioned purpose is provided with the following.

An information processor and a printer which were mutually connected so that communication was possible.

A storing means which stores information about a downloaded object in said printer.

A transmitting means which reads information stored by said storing means, and transmits this to said information processor.

A judging means which judges whether it is usable in an object required for processing when sending out said print data in said information processor based on information sent out by said transmitting means, A download means which downloads this object to said printer when not usable [in an object required for processing of said print data] as a result of a judgment by said judging means.

[0018]judging whether it is [information processor] usable in a required object according to the above-mentioned composition -- case it is not usable -- this -- a required object is downloaded to a printer. Since download is performed when a required object has not downloaded, download can be prevented from performing superfluously.

[0019]A printer of this invention for attaining the above-mentioned purpose, A loading means which downloads an object from the exterior, and a securing means which secures from a memory an inherent area which an object loaded by said loading means uses in occupancy, A printer characterized by having an execution means which performs processing of said object using an available common area and an inherent area secured by said securing means from two or more objects beforehand secured on said memory.

[0020]According to the above-mentioned composition, a common area for storing data used in execution of each object program about a downloaded object program becomes sharable in two or more download programs. For this reason, the necessity of securing all the workspace which an object program needs for every object program is lost. Although an inherent area which each object program should occupy is secured at the time of download, generally an inherent area turns into a small field compared with a common area. It enables this to aim at facilitation of management of a memory area and mitigation of memory space which are used for a download program.

[0021]

[Example]With reference to an attached drawing, the suitable example of this invention is described below.

[0022]This example is described with reference to drawing 13 about the composition of an adapted laser beam printer.

[0023]Drawing 13 is a sectional view showing the internal structure of the laser beam printer (it is only hereafter considered as a printer) of an example, and this printer can register registration, a tie-up form (form data), etc. of a character pattern from unillustrated data resources.

[0024]While 100 is a printer body and inputting and memorizing printed information, form (character code etc.) information, or a macroinstruction supplied from the host computer connected outside in drawing 13, A character pattern, a form pattern, etc. corresponding according to those information are created, and an image is formed in the record paper which is a recording medium. The navigational panel in which, as for 113, a switch, a LED display device, etc. for operation are allotted, and 110 are controller parts which analyze the text etc. which are supplied from control and the host computer of the printer 100 whole. This controller part 110 mainly changes text into the corresponding video signal of a character pattern, and outputs it to the laser driver 1002.

[0025]The laser driver 1002 is a circuit for driving the semiconductor laser 1003, and carries out the on-off change of the laser beam 1004 discharged from the semiconductor laser 1003 according to the inputted video signal. This laser beam 1004 is ** made into a longitudinal direction by the rotating polygon 1005, and carries out scanning exposure of the electrostatic drum 1006 top. By this, the electrostatic latent image of a character pattern will be formed on the electrostatic drum 1006. After this latent image is developed with the development unit 1007 allocated by the electrostatic drum 1006 circumference, it is transferred by the recording form. Using a cut sheet in this recording form, a cut sheet recording form is stored by the paper cassette 1008 with which the printer 100 was equipped, by the feed roller 1009 and the transportation rollers 1100 and 111, is incorporated in a device and supplied to the electrostatic drum 1006.

[0026]Although the printer 100 of a laser-beam method is used in explanation of the following examples, it is clear for it to be able to apply also to the printer of other recording methods, such as an inkjet method.

[0027]Drawing 1 is a block diagram showing the example of control constitution of the outline of the printer by this example. In the figure, 100 is a printer. The printer 100 is greatly provided with the two composition 110, i.e., a controller part, and the engine part 120. The controller part 110 receives print data, control instruction, etc. from the exterior, creates image memory data according to it, and transmits the information to the engine part 120 as a video signal. The engine part 120 receives the above-mentioned video signal from the controller 110, and forms an image in space by making the signal into a visible image. Furthermore, the controller 110 communicates also with the engine part 120, tells the state of the engine part 120 outside, or performs overall control of the engine part 120, etc.

[0028]The controller part 110 is explained in detail. The controller part 110 is provided with the host interface (IOP) 111, the display panel 112, the navigational panel 113, CPU114, ROM115, RAM116, and the data bus 118.

[0029]IOP111 performs data transmission and reception with an external device (for example, host computer 130). The display panel 112 displays printer information, including the parameter of printing environment, etc. The navigational panel 113 performs setting out of the various parameters of printing environment, and the input of change. CPU114 performs control of the whole device, analysis of print data, creation of image data, etc. ROM115 stores the control program of a device, various printer control language, font information, etc. RAM116 provides temporary information storage regions, such as storage of the data which can be sent from the outside, storage of various printing parameters, and a work region of information processing. RAM116 is provided with the download information storing part 116a for storing downloaded information. The data bus 118 connects above-mentioned each part, and transmits various kinds of data in the inside of a controller.

[0030]Download is that a printer loads an "object" to the device in which RAM116 in a printer or re-writing is possible from the exterior of the printer concerned in the state of a power turn. It becomes possible by loading said object to add various kinds of printer functions. Objects are data (font etc.) which can be referred to from the program which can be executed on a printer, and the program built in a printer.

[0031]Drawing 2 is a flow chart showing the procedure of the download processing of this example. Starting of downloader will input an object via ********** from the printer exterior (Step S202). (Step S201) The inputted object is arranged on RAM116 (Step S203). Next, the kind of object is judged (Step S204) and the interface part of an internally stored program and an object is changed for every object (Step S205). Finally, downloaded information is updated (Step S206) and this processing is ended.

[0032]It is judged whether the judgments of the kind of object in the above-mentioned step S204 are whether the object concerned is a program, for example and data. When the object concerned is a program, it judges any they are, such as a translator program, a scaler program, or patch programs. When the object concerned is data, it is judged further any they are, such as font data, macro data, and table data (a tile, a dither pattern, etc.). Change of the interface part in Step S205 performs registration processing of a download object according to the judgment of the kind of this object.

[0033]In the conventional printer, downloader had changed downloaded information only at the time of download processing. Drawing 3 is a figure explaining the program configuration in connection with the downloaded information in the conventional printer. That is, the downloaded information stored in ** 116a of downloaded information ** is managed only by the downloader 200, and only downloader can perform reference and change. Every time the downloader 200 had the function with it to give this information to other composition, it could not be, therefore don't refer to the downloaded information for it when performing other functions.

[0034]According to the printer of this example, the right to access to various downloaded information is granted to not only downloader but other portions. Drawing 4 is a figure explaining the program configuration in connection with the downloaded information in the printer of this example.

[0035]In this example, the direct right to access to various downloaded information is not granted to downloader. As shown in drawing 4, direct access to the downloaded information stored in the download information storing part 116a is performed at the independent downloaded information Management Department 201. Therefore, the downloader 200 updates downloaded information by requiring renewal of information of the downloaded information Management Department 201 after download processing. When the downloader 200 refers to downloaded information, an inquiry to the downloaded information Management Department 201 is performed. Similarly, when other programs refer to downloaded information, it is attained by asking this downloaded information Management Department 201.

[0036]Thus, a user becomes possible [grasping the situation of download easily] with constituting so that the control program for performing other functions can refer to downloaded information. For example, with outputting the information (downloaded information) about the object downloaded to the printer to a host computer, a host computer displays this or, in addition to this, various kinds of processings of it are attained. The output procedure of the printer in this case is explained below.

[0037]Drawing 5 a is a flow chart showing procedure when this printer receives a job control language. Two-way communication is possible for the host computer 130 and the printer 100, and the program (printer driver 131 (drawing 1)) which controls a printer is operating on the host computer 130. This printer driver 131 can acquire the state and setup information of the printer 100 by performing a printer and bidirectional communication. Such communication is performed by transmitting a job control language to the printer 100.

[0038]Here, the job control command of notifying downloaded information from the host computer 130 to the printer 100 is sent. In the printer 100, if a job control command is received, the command concerned will be analyzed and the command processing will be performed (Step S411, 412).

[0039]Drawing 5 b is a flow chart showing the procedure which outputs downloaded information out of a printer through a communication line. If the output requirement of downloaded information is received from the exterior (here host computer 120), this processing will start. In Step S402, downloaded information is first read from the download information

storing part 116a. And in Step S403, while processing the read downloaded information to information suitable for the communication to the exterior, conversion to a format suitable for communication is performed. Finally, the information acquired by Step S403 is outputted to an interface (IOP111) (Step S404).
[0040]In this way, downloaded information is transmitted to the host computer 130 via an interface. Processing of information in the above-mentioned step S403 is explained. The downloader Management Department performs read-out by the download information storing part 116a of downloaded information. Since the data form of the downloaded information acquired here can be recognized in the downloader Research and Data Processing Department, when outputting downloaded information to a host computer, it is necessary to process it to the information that a host computer can be recognized. Then, conversion in the form which a host computer can recognize, for example, text format, is performed.
[0041]It becomes possible to notify downloaded information to the host computer 130 as mentioned above. Next, operation of the host computer using the downloaded information by the printer of this example 1 is explained using the flow chart of drawing 6 a and drawing 6 b. Drawing 6 a and b are the flow charts showing the procedure of the host computer 130 using the downloaded information acquired from the printer of Example 1.
[0042]Two-way communication is possible for the host computer 130 and a printer, and the program (printer driver 131) which controls a printer is operating on the host computer 130. This printer driver is beforehand provided with various kinds of download objects.
These use is possible.
Various kinds of expansion in a printer can be performed by downloading these objects if needed.
[0043]First, in Step S502, connection of a printer, setting out of a model, etc. are performed as pretreatment of data output. Reception of the downloaded information from the printer 100 is also performed.
[0044]Drawing 6 b is a flow chart showing the details of pretreatment of the data output in Step S502. In data output pretreatment, the machine kind information of the printer connected is acquired first (Step S5001). The downloaded information which shows the already downloaded contents to a printer is acquired (Step S5002). And the function with which a printer is beforehand provided based on machine kind information is recognized, and the function added based on downloaded information is recognized, and the printer concerned lists the function which it already has.
[0045]Next, in Step S503, it is judged whether the printer 100 is provided with the function required for printing which it is going to perform from now on. Here, in addition to the information which shows the function with which the printer 100 is provided beforehand, also with reference to the downloaded information which shows the object downloaded to the

printer 100, it is judged whether the function required for the printer concerned is equipped.
[0046]When a printing job can be performed by the function with which the printer 100 is already provided, from Step S503, it progresses to Step S504 and the output of print data is performed. On the other hand, when printing using the function which does not exist in a printer, it progresses to Step S505, and download of the object which realizes the function is performed. And in Step S504, print data are outputted to the printer 100. The printing job which used this object is performed in the outputted print data. At Step S506, the end of the output of print data is checked, if it has not ended, it returns to Step S502, and the output process of print data is continued. This processing will be ended if the end of the output of data is checked.
[0047]As mentioned above, although the case where an object was downloaded to RAM13 was explained, the download place of an object is not restricted to RAM. The download place of an object should just be a device in which re-writing is possible, for example, a flash ROM may be used for it. A flash ROM is ROM which can be written in and can be eliminated, and after finishing the writing by download, it can treat like extended ROM.
[0048]Drawing 7 expresses the example of a command by the job control language for an inquiry of the downloaded information from the host computer 130 to the printer 100. This example is requiring the information on the function stored in the flash ROM. Drawing 8 is an example of the response data from the printer 100 to the command shown in drawing 7. According to this example, the printer 100 is equipped with the flash ROM at the slot 1 and the slot 2, and the font scaler and the macro program are stored, respectively.
[0049]In the procedure of the above-mentioned host computer, the existence of the function which a printer has is checked, whenever it performs a printing job, but the check is performed in the stage before performing a printing job, and a printing job can be made to also make it carry out according to the information. With the stage before performing this printing job, the time of making the power supply of a printer one, for example just before the first printing job, etc. are mentioned.
[0050]As shown in drawing 9, printer 100 self is provided with the auxiliary storage units 140, such as a hard disk, and has not downloaded in the printer yet, but it may be said that download data is stored in this hard disk. In this case, download [host computer / 130] is not performed, but it constitutes so that the download data of the auxiliary storage unit 140 may be given priority to and used. In this case, the information notified to a host computer from the printer 100 is information, the downloaded information which shows the downloaded function, and external function information which shows the function stored in the auxiliary storage unit 140 yesterday when the function which the printer concerned contains is shown.
[0051]As explained above, according to the printer of this example, downloaded information becomes possible [referring to it from the program (for example, print execution program of

the host computer 120) which performs other functions]. For this reason, for example, in the host computer 120, downloading an object superfluously is prevented and the processing speed as a system improves.

[0052]Although the above-mentioned example explained the composition which outputs downloaded information using a communication line, it may be made to output downloaded information to the display panel of a printer for example. If it does in this way, it will become possible to tell an operator about downloaded information with a printer simple substance. It is also possible to constitute the downloaded information which rice cake **** and the host computer 130 received via the communication line so that it may display on a display.

[0053]As an output method of downloaded information, it may constitute so that own downloaded information may be made to print to the printer concerned.

[0054]In the printer of the above-mentioned example, it cannot be overemphasized that it is possible to add the new function which a printer has by download like a download program. With such a new function, there are a description language (emulator) which controls printers including a font, a scaler which performs processing of picture information, etc. In addition to what is built in a printer from the beginning, it becomes possible by downloading two or more of these functions to provide various printing environment.

[0055]In order to prevent execution of unnecessary download, it is clear that the processing shown with the flow chart of drawing 6 a and b may be applied.

[0056]The above-mentioned example explains the case where a new function is added by download. However, since reference of downloaded information is enabled from the program which performs other processings according to the printer of this example, downloadable information is not restricted to this. For example, when the program (function) arranged ROM115 built in the printer has a bug, it becomes possible by downloading the revised edition of the function (namely, patch programs download) to escape the bug. By including this bug information in downloaded information, the internally stored program of a printer becomes possible [using patch programs]. Also when a printer has some versions, it becomes possible to create the patch programs corresponding to the model of these plurality.

[0057]Drawing 10 is a figure explaining the composition whose download of patch programs is enabled. In the figure, the program x, y, and z in ROM115 is a sub program executed if needed from a main program, respectively. A main program forms in RAM116 the patch table showing the stored address of each sub program, and a sub program required of referring to this patch table is executed.

[0058]Now, download of patch programs will store patch programs in RAM116. At this time, the address of the applicable sub program in a patch table is changed into the address of RAM116 which patch programs downloaded. By drawing 10, the patch programs x download to the program x, and the state where the contents of the patch table were changed is shown.

As a result, a main program comes to execute the patch programs x instead of the program x by referring to a patch table.

[0059]In the example mentioned above, the download object assumed the thing comparable as what is contained in built-in ROM. Specifically, the download program (an emulator, a scaler, patch) and the download font are assumed. However, it is also possible to apply information equivalent to the image data after being processed within the printer as a download object.

[0060]Usually, within a printer, the printing job description language sent from the outside is analyzed, and the printed information or picture information to an engine part is created. This processing is performed out of a printer and download of that result is performed. By carrying out like this, it becomes possible, without using the function which the printer does not have changing the composition of a printer. The next is raised as an example. The image data (overlay data etc.) of the fixed form often used is beforehand processed with the host computer, and the deployment result is downloaded. When performing printing, it prints with reference to the download data. As a result, it becomes unnecessary to carry out development processing of the image data of a fixed form for every page, and saving of processing time is attained.

[0061]Although Dow load information is referred to in the above-mentioned Example 1 with the job control language received from the host computer 130, it is also possible to constitute so that it may not be restricted to this but a reference process may be performed by keystroke [navigational panel / of the printer 100].

[0062]<Example 2> this example 2 explains memory assignment of the external variable field in the case of providing a program by download or extended ROM.

[0063]Here, when downloading a program, the memory assignment in the case of providing especially an emulator program (translating program of a Page Description Language) by download or extended ROM is explained.

[0064]Generally, when an emulator is downloaded, the external variable field on RAM which the emulator uses is dynamically secured to the degree of download. Since access to an external variable field is generally performed by the actual address when an emulator is provided by extended ROM, a field must be beforehand secured to only the emulator.

[0065]In the state where two or more emulator programs were generally loaded, two or more emulator programs are not started simultaneously. However, since it is necessary to save some external variables also in a non-operating state in each emulator, the field secured by each emulator turns into a field for exclusive use to the last, and cannot be used from other programs.

[0066]According to this example 2, it divides into the inherent area which memorizes the external variable where the emulator concerned must save an external variable field at the time of un-operating, and the common area which memorizes an external variable required for a target temporarily at the time of execution of the emulator concerned, and the external variable field to a RAM top is assigned.

[0067]That is, in Example 2, an emulator uses the common area beforehand secured on RAM as an external variable field based on the premise that two emulators do not operate simultaneously. This common area is a field shared by all the emulators. It becomes unnecessary thus, to assign an external variable field for exclusive use by assigning for the emulator extended. On the other hand, when performing the original emulator again after an emulator changes to other emulators, a former state cannot be memorized to an external variable only in a common area. In order to solve this, it is made to correspond to each emulator program by making into an inherent area the field for memorizing the external variable which should be saved, and assigns on RAM.

[0068]Drawing 11 is a figure showing the quota state to RAM of a general external variable field. Each emulator has secured the external variable field of exclusive use [each]. There is no distinction of an inherent area and a common area in this external variable field. Therefore, each emulator secures all the required external variable fields individually regardless of the time of un-performing at the time of execution. On the other hand, drawing 12 is a figure showing the state of the reservation on RAM of the external variable field by this example 2. Each emulator divides and secures an inherent area and a common area. Here, an emulator common area is a field used in common from various kinds of emulator programs, and is beforehand assigned to the prescribed address. In each emulator program, in order to access this common area, it accesses with an absolute address. The inherent area individually assigned to each emulator program on the other hand is dynamically assigned, when an emulator program downloads, or when it is provided by extended ROM. Therefore, access to an inherent area is performed by the relative address.

[0069]As mentioned above, according to the Example 2, it becomes possible to provide the shared area which can be used in common in all the emulator programs. Generally, the number of bytes of an inherent area and a shared area has a way of an inherent area in few tendencies overwhelmingly. Therefore, the quantity of a required memory is effectively mitigable by sharing a common area between two or more emulators for two or more emulator programs in a switchable printer.

[0070]Although the above-mentioned Example 2 explained the emulator program, if it is an object program alternatively executed from two or more programs, the above-mentioned technique is applicable.

[0071]It is possible to apply a flash ROM as a loading place of a download object also in Example 2. The flash ROM after performing download will operate the same with having equipped with extended ROM. In this case, although the storage location of an object serves as an address of a flash ROM, an external variable field (an inherent area and a common area) is assigned on RAM.

[0072]It cannot be overemphasized that it is good also as composition which combined the above-mentioned Example 1 and Example 2. It is because consumption of the useless memory by the download with which the emulator program overlapped can be prevented.

[0073]Since downloaded information can be referred to from function parts other than downloader according to the above-mentioned Example 1 as explained above, the output of downloaded information is attained to the exterior of a printer. Thereby, external devices, such as a host computer, become possible [performing efficient processing using this downloaded information].

[0074]The operator of a printer can be told about various kinds of downloaded information the output to a display panel, and by making it output by printing.

[0075]According to the composition of Example 2, the external variable field which is needed when executing a download program is divided into a common area and an inherent area, it becomes possible to assign a common area about all the download programs, and mitigation of the burden of memory management and mitigation of the usable capacity of a memory are achieved.

[0076]Even if it applies this invention to the system which comprises two or more apparatus, it may be applied to the device which consists of one apparatus. It cannot be overemphasized that this invention can be applied also when attained by supplying the program which performs processing specified to a system or a device by this invention.

[0077]

[Effect of the Invention]As explained above, according to this invention, it becomes possible to refer to the information on the object which downloaded the download object in the available printer from function parts other than downloader.

[0078]According to other composition of this invention, it becomes possible to notify the contents of downloaded information to a user or the exterior.

[0079]According to other composition of this invention, by notifying the downloaded information of the printer concerned to a host computer, it becomes possible to prevent the duplicate download to a printer from a host computer, and is effective in the processing speed of a system improving.

[0080]According to other composition of this invention, two or more download programs are enabled to use a common memory area, and the flexible correspondence to facilitation of memory management, mitigation of memory consumption, change of a download program, etc. is attained.

[0081]

[Translation done.]